reported that seedling densities of *Acacia* species become dominant after fire. However, the understanding of the influence of smoke on seed germination and seedling growth is very limited. In this study, the species of *Acacia* tested were *A. hebeclada*, *A. mearnsii* and *A. robusta*. Results show that seeds of *A. hebeclada* germinated under different light conditions with a smoke-derived butenolide solution (10^{-7} M), exhibited a significantly greater germination percentage than untreated seeds. *A. mearnsii* seeds exposed to constant dark conditions showed a significantly better germination percentage than the dark control. However, there was a non-significant improvement in germination for *A. robusta* seeds. All three species responded positively to the butenolide treatment after incubating for 10 days under constant dark conditions at 25±0.5 °C, achieving a higher vigour index and seedling mass in comparison to the controls. Smoke–water (1:500) had an intermediate effect on these species. This study shows that the butenolide, isolated from smoke, may have a significant effect on the post-fire seedling ecology of *Acacias*. In addition, soil sowing experiments indicate the possible use of smoke solutions to stimulate seed banks of highly invasive species *A. mearnsii*.

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Is species richness multifractal? Lessons from the Protea Atlas

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Multifractals are densities that show detail at all scales. For species richness, this means that, at every scale, areas of high richness will have nearby areas of low richness. We present a very simple model for simulating such a pattern, and show that the model captures many aspects of the richness of Proteaceae in the Cape Floristic Region. The main implication is that the classic smooth functions of the SAR may be inadequate both for theory and for applications.

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A taxonomic study of the type section of the genus *Lebeckia* Thunb. (Fabaceae, Crotalarieae)

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A taxonomic study of the type section of the genus *Lebeckia* Thunb. (sect. *Lebeckia*; syn. *Eu-Lebeckia* Benth., *Phyllodiastrum* Walp.) is presented. The genus was last revised in 1862 by Harvey and consists of some 33 species. *Lebeckia* section *Lebeckia* is endemic to the Cape Floristic Region and consists of 14 species that differ from all others by their simple, acicular leaves. Based on fruit morphology, four informal species groups have been distinguished: (1) the *L. sepiaria* group (4 spp.) — fruit terete or semi-terete, ±sessile, (2) the *L. plukenetiana* group (6 spp.) — fruit stipitate, flat, (3) the *L. pauciflora* group (2 spp.) — fruit stipitate, semi-terete, and (4) the *L. wrightii* group (2 spp.) — fruit flat, ±sessile. An analysis of morphological characters revealed the existence of two undescribed species, namely "*L. brevipes*" M.M. Le Roux and B-E. Van Wyk *sp. nov. ined*., (hitherto confused with *L. longipes* Bolus and *L. pauciflora* Eckl. and Zeyh.) and "*L. brevicarpa*" M.M. Le Roux and B-E. Van Wyk *sp. nov. ined*., [previously confused with *L. sepiaria* (L.) Thunb.]. Diagnostic characters, nomenclature, typification and distribution maps of the species are discussed and illustrated, as well as the relationships within the section based on molecular and morphological data.

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Fine-scale variation in the spatial association of plant species: A test of the stress-gradient hypothesis in the sub-Antarctic

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The stress-gradient hypothesis (SGH) predicts that the importance of positive interactions increases along abiotic stress gradients. This hypothesis is well supported for plants in cold and windy alpine and arctic environments, but has not been tested at high southern hemisphere latitudes. We investigated the fine-scale spatial distribution of four dominant plant species across a scoria cone on Marion Island, to test if the SGH was supported for a location in the climatically extreme and species poor sub-Antarctic. A clear altitudinal abiotic stress gradient existed across the scoria cone, with lower temperatures, stronger winds and greater soil movement at higher altitudes. These abiotic patterns were matched by stronger interspecific spatial association at higher altitudes and in areas of lower vegetation cover. This suggests stronger interspecific facilitation under more stressful conditions, and supports the predictions of the SGH. Anisotropic spatial aggregation and association patterns suggest that species tend to grow and establish disproportionately in sheltered areas (i.e. in the lee of, or downslope of other established plants) where they are protected from the prevailing wind and sediment burial. Thus, at this site plants benefit from shelter from neighbouring plants, and the impact of this positive

interaction increases with altitude. This study, therefore, is the first to test (and to provide support for) the SGH in the sub-Antarctic, and highlights the broad applicability of the SGH for predicting spatial variation in plant interactions at high latitudes and altitudes.

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Improved flowering of a South African *Watsonia* with smoke treatments

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Although smoke treatments have successfully been used for promoting germination of many species, the effect of smoke in promoting flowering has not been widely investigated. Greenhouse experiments were conducted to evaluate the effect of different smoke treatments on the flowering of a spring-flowering hybrid of *Watsonia borbonica*. Corms of Watsonia 'Shrimp Pink' were treated with aerosol smoke or smoke water prior to planting in autumn (ten plants per treatment). For the aerosol smoke treatment, corms were placed in a sieve and exposed to cooled smoke for 30 min. For the drench treatments, 100 mL of smoke solution (1:500 or 1:2000 dilution) were applied to the plants weekly. A once-off drench treatment of a 1:500 smoke solution was also carried out. Only two of the control plants produced flowering spikes, whereas up to nine out of ten plants treated with a drench of 1:500 dilution of smoke water flowered. The development of a flowering spike did not appear to correlate with original corm size. Additionally, although not statistically significant, the average increase in corm weight was greater in smoke-treated plants than the control. Thus, smoke treatments may potentially be used to promote flowering in some geophytes.

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The pathway of starch degradation in potato leaves

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Starch degradation in leaves is a process that is still not well understood. Using a reverse genetics approach we have identified enzymes that are involved in this process. One of these is a protein which has a completely novel activity in that it phosphorylates starch using ATP, but utilizes a dikinase mechanism, transferring the β-phosphate to starch while releasing the γ-phosphate into solution. Plants lacking this protein contain starch with reduced levels of covalently bound phosphate and are unable to degrade transitory starch during the dark period. In addition we have identified a plastically localize β-amylase isoform which, when repressed using an antisense construct, also leads to the production of plants that are unable to degrade leaf starch to the same extent as controls. β-amylase manufactures maltose as a product of starch degradation and we have also identified a transglucosidase enzyme which is responsible for maltose catabolism. Plants lacking this enzyme accumulate maltose, and also are repressed in starch degradation.

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The effect of some of the indigenous medicinal plants in treatment of tick infected cattle-wounds in the Vhembe district of Limpopo Province, RSA

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Poor animal health is an important factor limiting animal productivity in most developing countries. Traditional medicine is important in developing countries that lack access to conventional medicines for animal health care. It has also been found to be accessible and affordable to poor rural farmers. Anti-repellent activities on indigenous medicinal plants that are used in treatment of wounds caused by ticks are being investigated. Instead of waiting for the wounds to be caused by ticks it can be productive to stop the ticks from attacking the animals.

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New generic circumscriptions of Cape peucedanoid species (Apiaceae)

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The genus *Peucedanum* L. as traditionally circumscribed is a group of ca. 120 species found in Africa, Europe and Asia. It is generally accepted that *Peucedanum sensu lato* is